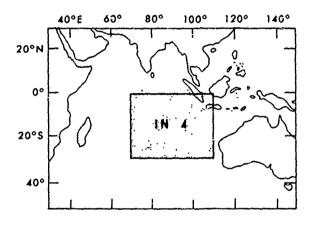
NAVAL OCEANOGRAPHIC OFFICE SF

SURFACE CURREN

CENTRAL INDIAN OCEAN



SEPTEMBER 1977

REPRINTED 1980



APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMI

DEPARTMENT OF THE NAVY NSTL STATION, MISSISSIPPI 39522





ABSTRACT

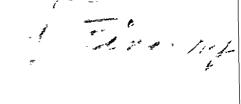
THIS ATLAS, AND THE SERIES OF WHILE IT IS A PART, IS COM-PUTER GENERATED AND AUTOMATICALLY PLOTTED. IT MAKES AVAILABLE TO THE USER THE MOST RECENT SURFACE CURRENT DATA COLLECTED AND WILL BE UPDATED WHENEVER SUFFICIENT AMOUNTS OF CATA ARE ADDED TO THE DATA FILE. THIS AND THE OTHER ATLASES ARE EASED ON A VAST QUANTITY OF DATA AS COMPARED TO THE PREVIOUS MANUALLY-COMPILED EDITIONS PRINTED IN THE MID-THIRTIES.

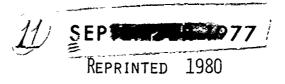
THE SURFACE CURRENT INFORMATION IS BASED MAINLY ON SHIP DRIFT, WHICH IS THE DIFFERENCE BETWEEN THE DEAD RECKONING POSITION AND THE POSITION DETERMINED BY ANY TYPE OF NAVIGATIONAL FIX. THIS DIFFERENCE DESCRIBES THE DIRECTION AND SPEED OF THE CURRENT.

SURFACE CURRENTS.

CENTRAL INDIAN OCEAN,







12/27/

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ACKNOWLEDGMENTS

Messrs. Raymond J. Beauchesne \star and William E. Boisvert made major contributions to this atlas.

^{*}Mr. Beauchesne presently is employed by the Bureau of Naval Personnel.

FOREWORD

THIS ATLAS, ONE IN A SERIES OF 43 REGIONAL SURFACE CURRENT ATLASES, IS PRODUCED TO FULFILL A NEED OF NAVY PLANNING STAFFS AND THE SCIENTIFIC AND INDUSTRIAL COMMUNITIES FOR THE LATEST AVAILABLE OCEAN SURFACE CURRENT DATA. THESE ATLASES ADD TO THE WEALTH OF NAUTICAL INFORMATION UPON WHICH OPERATIONAL PLANNING, NAVIGATIONAL SAFETY, AND SHIPPING ECONOMY DEPEND. RAPID PRODUCTION AND WIDE DISSEMINATION OF THIS ATLAS ARE MADE POSSIBLE BY THE LATEST COMPUTER TECHNIQUES.

THE CONSTANT IMPROVEMENT IN THE QUALITY OF SURFACE CURRENT DATA RECEIVED OVER THE YEARS IS MADE POSSIBLE LARGELY BY THE MORE THOROUGH REPORTS OF VOLUNTARY OBSERVERS IN RECENT YEARS. THE DEFENSE MAPPING AGENCY, THE OCEANOGRAPHIC OFFICE, AND THE USER OF THE ATLASES RELY ON THE PERSONAL OBSERVATIONS OF THE MAN WHO HAS "BEEN THERE." MARINERS, IN REPORTING THEIR OBSERVATIONS, RENDER A SERVICE NOT ONLY TO THEMSELVES BUT ALSO TO ALL "WHO GO DOWN TO THE SEA IN SHIPS." WITH THE ADVENT OF NUCLEAR POWER, ELECTRONIC NAVIGATION AIDS, AND 300,000-TON SHIPS, UP-TO-DATE, RAPIDLY DISSEMINATED ENVIRONMENTAL AND NAVIGATIONAL INFORMATION HAS BECOME INCREASINGLY IMPORTANT.

JOHN R. McDONNELL Captain, U.S. Navy Commander Accession For

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SURFACE CURRENT ATLASES

THIS SERIES OF COMPUTERIZED ATLASES REPLACES THE OLD HYDROGRAPHIC OFFICE ATLASES OF SURFACE CURRENTS (HOP 566, 568, 569, 570) WHICH WERE MANUALLY COMPILED FROM DATA OBTAINED DURING THE PERIOD 1903 - 1934. THESE NEW ATLASES CONFORM TO THE STANDARD NAVY OCEAN AREA AND REGION INDEX LIMITS SHOWN BELOW: e.g., NOO SP 1402-NP 10 COVERS NORTH PACIFIC REGION 10 EAST OF THE PHILIPPINES.

AS AMOUNTS OF NEW DATA WARREN

THESE GRAPHICS MAY NOT AREAS AS THE NORTH SEA. PERST CURRENTS ARE STRONGLY FIDAL. PREDICTABLE HOURLY CHANGES F

RECENT IMPROVEMENTS IN THE DATA FILE ASSURE THE INCLUSION OF THE LATEST. HIGH QUALITY SURFACE CURRENT DATA AVAILABLE. THE FILE NOW CONTAINS MORE THAN 4,200,000 OBSERVATIONS AND A GENERAL UPDATE OF THE FILE WILL BE MADE.

INDEX 80° 60° 160° E 180° 160°W 140° 120° 100° 40° 80° 100° 120° 140° 1402 1402 60° 1402 1402 40° NP 9 NP 8 1404 2 1404 1402 1402 1402 1400 20° **NP 10** NP 12 NP 13 IN 1 NP 11 0° 1403 1404 1403 1404 1403 1403 SP 3 IN 4 SP 1 -SP 2 🦠 IN 5 SP 3A 20° ,1493 1403 1403 1404 14G3 1404 1404 SP 6A 40° **IN 7** IN 8 SP 6 IN 6 SP 5 1403 OCEAN AREA SURFACE CURRENT ATLASES SP 1400 NORTH ATLANTIC OCEAN SP 9A 60° SP 1401 SOUTH ATLANTIC OCEAN SP 1402 NORTH PACIFIC OCEAN SP 1403 SOUTH PACIFIC OCEAN SP 1404 INDIAN OCEAN 60° 80° 120° 140° 160° 100° 100° 180°

SURFACE CURRENT ATLASES

D HYDROGRAPHIC OPFICE H WERE MANUALLY , THESE NEW ATLASES LIMITS SHOWN BELOW: BT OF THE PHILIPPINES. AS AMOUNTS OF NEW DATA WARRANT, MOST LIKELY EVERY 12 - 18 MONTHS.

THESE GRAPHICS MAY NOT BE TRULY REPRESENTATIVE OF THE ACTUAL FLOW IN SUCH AREAS AS THE NORTH SEA, PERSIAN GULF, GULF OF THAILAND, AND YELLOW SEA WHERE CURRENTS ARE STRONGLY TIDAL. FOR SUCH AREAS, OTHER SOURCES DESCRIBING PREDICTABLE HOURLY CHANGES OF TIDAL CURRENTS SHOULD BE CONSULTED.

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INDEX 60° 160° E 160°W 140° 120° 100° 80° 40° 0° 180° 20° 20° सु 1400 1400 NA 1 NA 2 1402 1400 NP 5 1402 1402 1400 7 NP 9 NA 7 NP 8 1402 1402 1400 1400 1402 20° NP 11 NP 12 **NP 13** NA 10 1400 NA 11 1403 1403 1403 1403 1401 1401 SP 1 2 SP 2 SP 3 SA 1 SA 2 3P 3A 20° 1403 1401 403 1403 1403 1401 1401 SP 6A SP 5 SP 6 SA 3 SA 4 40° 1403 1401 OCEAN AREA SURFACE CURRENT ATLASES SP 1400 NORTH ATLANTIC OCEAN SP 9A SA 5A SP 1401 SOUTH ATLANTIC GCEAN SP 1402 NORTH PACIFIC OCEAN SP 1403 SOUTH PACIFIC OCEAN SP 1404 INDIAN OCEAN 160° 120° 100° 80° 60° 40° 20° 0° 20°

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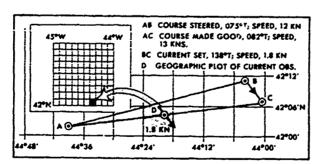
General Quality

The quality of this data file is considered high for this type of derived value. The data have been carefully screened for duplication; observations taken under adverse conditions (i.e. high winds and waves, time between observations greater than 12 hours) have been eliminated when warranted. Consideration was given to the reliability of the observer; doubtful shipboard computations of set and drift were edited; and observations with erroneous locations (mostly observations on land) have been eliminated. The accepted data are considered most useful when used collectively as in summaries where a number of observations show trends.

General Observation Technique

The set (direction) and drift (speed) are computed by the navigator from the difference between the dead reckoning (DR) position and the position determined by any type of navigational fix. The drift can be determined along any straight line track and includes all factors which cause changes in the DR position. When a fix is obtained, the current set (direction) is FROM the DR position TO the fix; the drift (speed) is equal to the distance in nautical miles between the DR and the fix, divided by the number of hours since the last fix. For successive observations, the TO POSITION of one observation becomes the FROM POSITION of the next observation

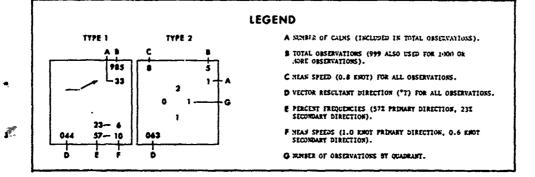
Secause the influence of current may vary along a ship's track, the MEAN POSITION of the track is assigned as the geographic location of the current observation. An exam of a current computation is shown in the figure below.



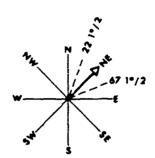
EXAMPLE OF A SURFACE CURRENT (SHIP'S DRIFT) OBSERVATION

Data Presentation

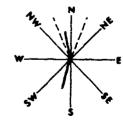
The following legend shows two types of surface current presentations by 1° quadrangle, type 1 with 12 or more observations and type 2 with fewer than 12 observations. Where there are 11 or fewer observations within a 1° quadrangle, the total number of observations is shown within the 90° quadrant containing the observations.



If there are 12 or more pheery by vector resultants as follow



(1) Persistent Current - 60 percent or more of (2) Prevai all observations fall within a 45° sector of the 8-point compass.



all of

(4) Bizonal Flow - Practically all observa are concentrated in opposite pairs of sectors, and one pair contains at less 80 percent as many observations as the pair. This generally indicates variab: that occurs in zones of entrainment be: opposing currents (see examples A and I quadrangles 1, 2, and 3).



If there are 12 or more observations in a 1° quadrangle, the surface current is depicted by vector resultants as follows:

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rom the difference by any type of e track and includes tained, the current is equal to the one observation

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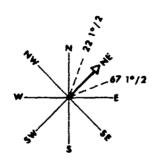
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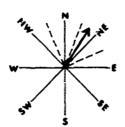
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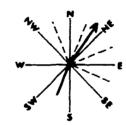
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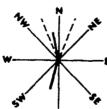
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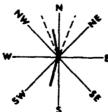




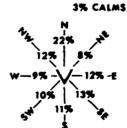


- (I) Persistent Current 60 percent or more of all observations fall within a 45° sector of the 8-point compass.
- (2) Prevailing Current 70 percent or more of all observations fall within two adjacent 45° sectors.
- (3) Primary Current with Secondary Direction
 (a) Primary Current 50 percent or more of all observations fall within three adjacent 45° sectors.
 - (5) Secondary Direction 20 percent or more of all observations fall within a 45° sector, and the two resultant vector directions are separated by more than 90°

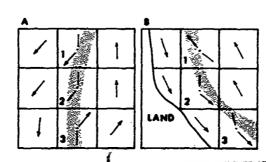




(4) Bizonal Plow - Practically all observations are concentrated in opposite pairs of 45° sectors, and one pair contains at least 80 percent as many observations as the opposite pair. This generally indicates variability that occurs in zones of entrainment between opposing currents (see examples A and B, quadrangles 1, 2, and 3).



(5) Variable Current - The 45° sector with most observations has less than 25 percent of all observations; direction is indeterminate.





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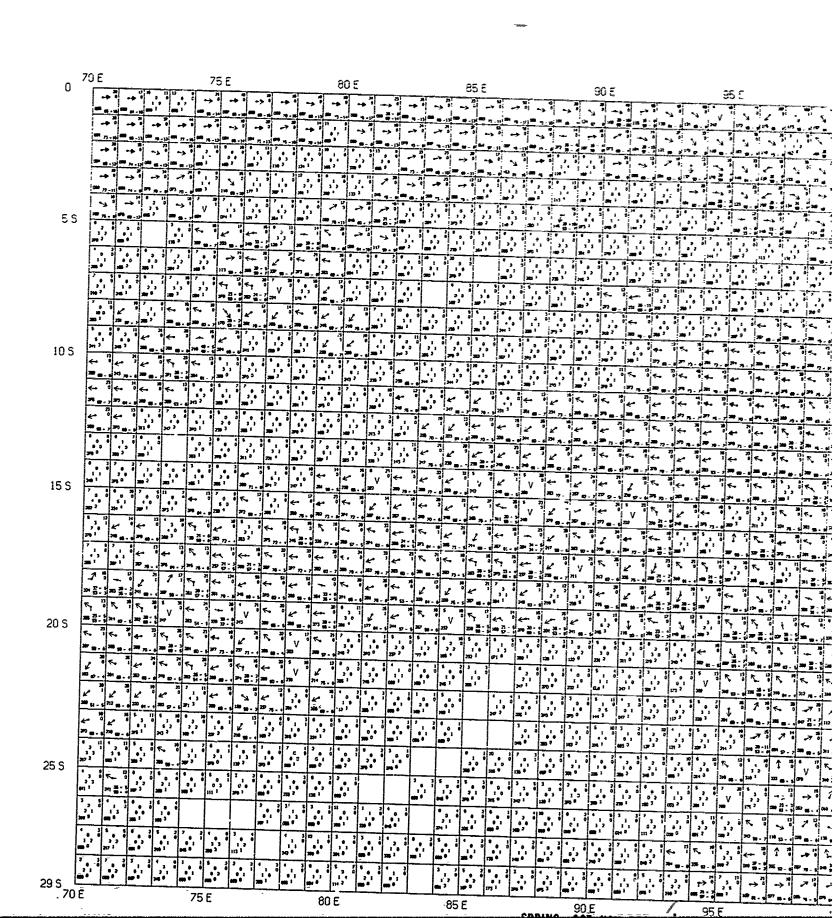
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